Hydrosense

K2000000 Series Multi Zone Water Detection Control Panels

Installation, Commissioning and Operating Manual

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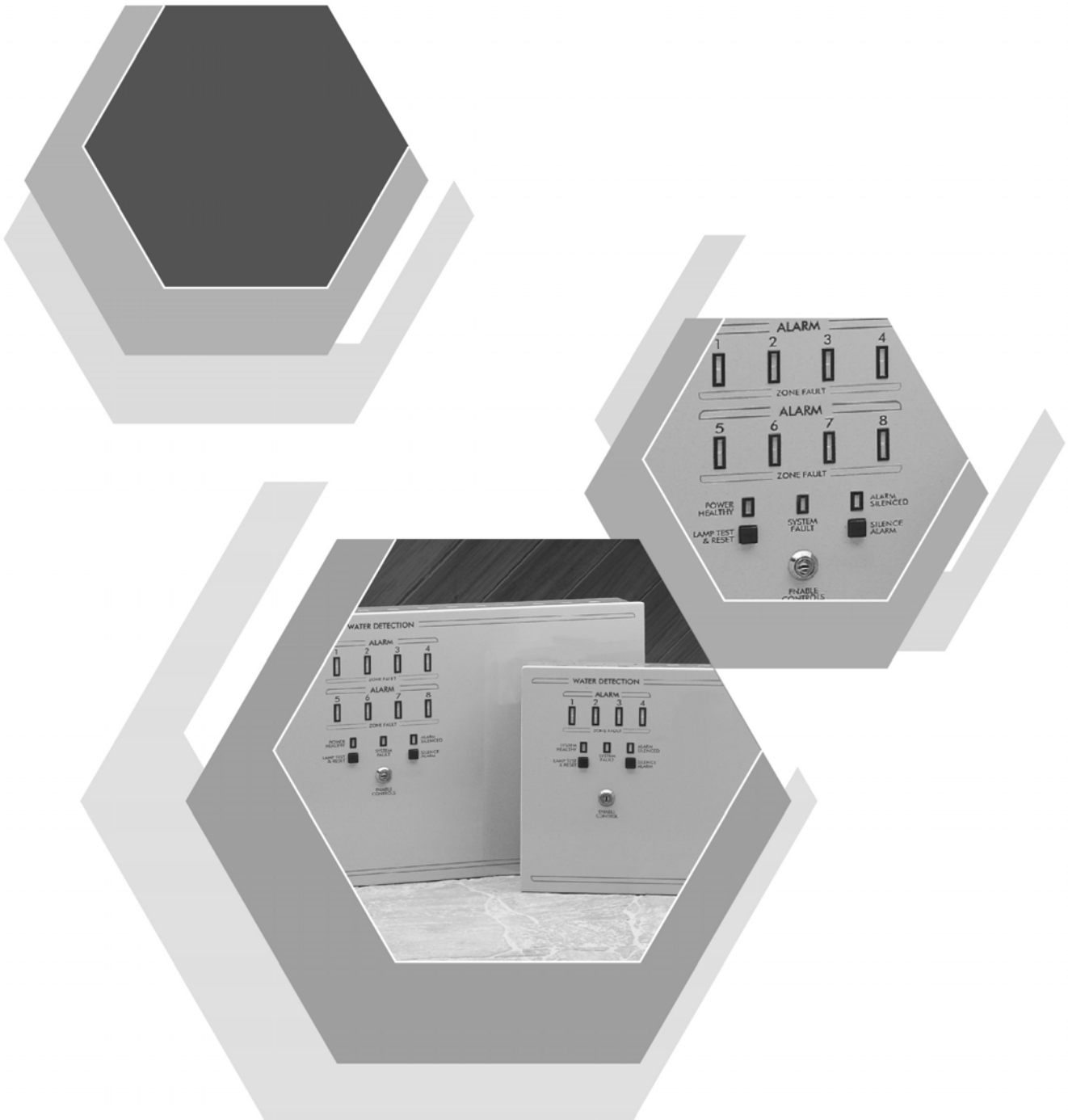

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1.0 General

The K2000000 range of Water Detection and Control Panels has been designed to offer high integrity protection in premises requiring from two zones upwards.
The extensive range of standard features and options allows most requirements to be satisfied by on site configuration of switches and links.
Standard features also include engineering functions for ease of maintenance, testing and repair.
Controls and indications are kept to a minimum at the front panel to ensure clear and concise indication of the system's status at all times.
This system contains static sensitive high quality electronic control equipment. Care should be taken when connecting field wiring.
Do not make any connections with mains or battery power applied. The cabinet should be connected to a suitable earth point at all times.

2.0 Front Panel Indications

2.1 System Healthy

Under normal conditions the greed system healthy indicator is illuminated. The system healthy indicator will extinguish in the event of :

(i) Mains Failure
(ii) Battery Disconnection
(iii) Systems Fuse Failure
(iv) T otal Power Failure

2.2 System Fault

The system fault indicator will illuminate under any abnormal condition. Certain conditions may be diagnosed without looking inside the enclosure as follows :

(i) System fault on, Power Healthy off:
Mains or battery failure
(ii) System fault on, zone fault on:
Zone fault in indicated zone.

2.3 Alarm Silence

The alarm silenced indicator should only be accompanied by one or more steady alarm indicators and indicates that the sounders have been silenced.
Operation of subsequent alarm zones will extinguish the alarm silenced indicator.

2.4 Zone Fault

Illumination of a zone fault indicator may mean that one or more trigger devices are inoperative and requires immediate attention.
Zone fault indicators will illuminate in the event of :
(i) Disconnection or severance of zone wiring
(ii) Short circuit on zone wiring
(iii) Removal of a sensor
(iv) Disconnection of the end of line monitor resistor
(v) Test mode activated.

The zone fault indicator will be accompanied by the system fault indicator.

2.5 Water Alarm

Upon detection of an alarm the green water alarm indicator will flash to give warning of the area (zone) affected. A flashing alarm indicator will be accompanied by a pulsing buzzer within the control panel and operation of the sounders.

3.0 Front Panel Controls

3.1 Alarm Silence
To silence an alarm activated by operation of a detection zone input, press the alarm silence button. The alarm silence button will only become operative with the key switch in the enable control position.

3.2 Reset & Lamp Test
All indicators may be illuminated, for testing purposes, by pressing the reset and lamp test switch, if any zones are in alarm condition these will be reset providing that the input signal e.g. hydrowire or probe has been restored to normal. The reset and lamp test switch will only become operative with the keyswitch in the enable control position.

3.2 Keyswitch
The keyswitch has two position:

(i) Normal
(ii) Enable Controls

With the keyswitch in the enable position the internal buzzer will "beep" every few seconds and the alarm silence and reset/lamp test switches are enabled.

4.0 Internal Indications

4.1 S1 (Sounder Circuit 1 Fault)
This indicator will illuminate in the event of a short or open circuit fault detected on the wiring to sounder circuit 1 or failure of fuse F3.
The front panel system fault indicators will also illuminate.

4.2 S2 (Sounder Circuit 2 Fault)
As above for sounder circuit or failure of fuse F4.

4.3 Fuse
Failure of either fuse F1 or F2 will illuminate this indicator. Failure of fuse F2 will be indicated by the front panel system indicator.
Failure of fuse F1 will not illuminate the front panel system fault indicator.

4.4 REM
This indicator will illuminate upon activation of the isolate remote (dil switch A) switch on the CON.05 pcb. The front panel system fault indicator will also illuminate.

4.5 CON (C)
Disconnection of ribbon cables to extender boards will illuminate the Connector indicator. The front panel system fault indicator will also illuminate.

4.6 TEST (T)
Operation of one or more zone test switches will illuminate this indicator.

5.0 Internal Controls

5.1 DIL Switch A
Operations of the dil switch A will prevent the remote signal relay contacts from operating upon activation of an alarm. The system can then be tested without activation of plant or signalling equipment connected to this contact. Indications are given as in 4.4 whilst the switch is operated.

5.2 Isol
A D.I.L switch is provided to isolate the detection zones individually. When operated the zone fault and system fault indicators will be illuminated. Triggering of isolated detection zones will not be detected by the control equipment.

5.3 Test
A D.I.L switch is provided to enable testing of individual devices on any given zone without returning to the control panel to reset in between.
With the test switch operated, the system fault and zone fault indicator will be illuminated. Activation of a zone will illuminate the alarm indicator and sound the alarms as normal, however the zone will self reset after a few seconds. Only 1 zone must be in test mode at any time.

6.0 Wiring Connections

6.1 Power Supply Input

Four terminals are provided for connection to the power supply these are :

(i) + to +24 volt load output at PSU
(ii) -to –VE load output at PSU
(iii) PF to power fault output at PSU (Not normally used)
(iv) PO to power on output at PSU

Under normal (no fault) circumstances a –VE appears at the PO terminal and illuminates the Power Healthy lamp on the front panel. If a power fault occurs (mains or batteries disconnected) to –VE disappears from the PO output and is transferred to the PF terminals A –VE at the PF terminal on the Con.05pcb will illuminate the system fault lamp on the front panel and sound the internal buzzer.

6.2 System Fuse

A 5amp 20mm quick blow fuse is fitted and marked F1 on the pcb. This is the system fuse and is intended to protect the internal circuitry against the high current capacity of the battery.
The fuse is monitored and failure is indicated by extinguishing of the Power Healthy lamp on the front panel, an internal indicator is marked "FS" and a continuous tone from the internal buzzer. Failure of this fuse renders the entire system inoperative.

6.3 Auxiliary Fuse

A 500m A 20mm quick blow fuse is fitted and is marked F2 on the pcb. This is the auxiliary 24 volt output protection fuse and is intended to protect the system from incorrect operation by faults or failure of any equipment connected to the system. Any externally connected equipment which uses the water alarm power must take the power from the "aux 24V terminals to ensure reliable operation of the system as a whole.
The fuse is monitored and failure is indicated by the system fault lamp on the front panel, an internal indicator marked "FS" and a continuous tone from the internal buzzer.
The buzzer may be muted by operation of the alarm silence button. Failure of this fuse does not affect correct operation of devices connected to the detection zones or the operation of sounder outputs and relay contacts.

6.4 Remote Control Input

Four terminals are provided for duplicate the controls found on the front panel. These are marked; OV, AL, S and R short circuit at OV and AL will activate the two common alarm outputs. Removal of the short will de-activate the alarm outputs A short at OV and S will silence any zones which are in alarm. This input must be momentary as a maintained short at this input will put any fresh alarms immediately into alarm silence mode A short at OV and R will reset the system and perform a lamp test. This input must be momentary as a maintained short at this input will hold the system in lamp test and reset mode.

6.5 Rem. Sig. Contact

A volt free changeover contact is provided for signalling to an autodialler, house system or plant shutdown relay. This contact operates upon any alarm condition and remains operated until the system is reset.
Operation of this contact may be inhibited for testing purposes by operating the dil switch on the pcb marked A.
Operation of the isolate switch will be indicated by the system fault on the front panel, a "Bleep" tone from the internal buzzer and an internal led marked "R".
The remote signal contact must only be used for switching up to 30 Volts DC at a maximum of 1 Amp.
Under no circumstances should voltages or currents outside this maximum be connected.

6.6 Fault Contact

A volt free contact is provided for transmitting a fault signal to a remote location. This contact will operate upon any fault condition and will remain operated until the fault is cleared. The contact will also be operated upon total power failure.
The maximum rating of this contact is 1 Amp at 30 volts DC.
Under no circumstances should voltages or currents outside of this maximum be connected.

6.7 Alarm Contact

A volt free contact is provided for signalling a common alarm condition to a remote location. This contact is a pole of the alarm relay and will follow the action of the alarm sounder i.e. it will de-activate upon alarm silence condition.
The maximum rating of this contact is 1 Amp at 30 volts DC.
Under no circumstances should voltages or currents outside of this maximum be connected.

6.8 Repeat Contact

A normally open contact is provided for each zone. This contact will close upon activation of the zone and will remain operated until the zone is reset.
The maximum rating of this contact is 1 Amp at 30 volts DC.
Under no circumstances should voltages or currents outside of this maximum be connected.

6.9 Sounder Outputs

Two sounder outputs are provided marked S1 (+ and -) and S2 (+ and -). These are monitored for both open and short circuit faults and are individually fused at 1 Amp each.
The short circuit threshold is set, so that if more than 3m A is drawn from the monitoring circuit, a fault will be indicated. This prohibits the connection of unpolarised or reverse polarity connection of sounders of even very low current consumption types.
The open circuit threshold is set such that if less than 1.5mA is drawn by the end of line monitoring circuit, an open circuit fault will be indicated. This feature has been put to use quite successfully on a number of occasions to monitor two sounder circuits wired in parallel and fitted with 22K or 27K end of line resistors. This is particularly useful if extra sounder circuits have been wired in error for replacement panels.

6.10 Detection Circuits

The detection circuit comprises of a common negative supply and a positive feed via a sense resistor. The circuit is monitored for both open and short circuit faults and can also detect the removal of a sensor.
The threshold levels at the normal supply voltage of 28 volts are :

(i)	0	to	30	OHMS + SHORT CIRCUIT
(ii)	31	to	700	OHMS = ALARM
(iii)	701	to	3500	OHMS = DETECTOR REMOVED
(iv)	9000+			OHMS – OPEN CIRCUIT

As can be seen from the above any trigger device which presents the circuits with a resistance of 31 to 700 OHMS at 28V DC will activate the detection circuit.
Up to 1.6mA may be drawn from the detection circuit without inhibiting open circuit line fault indication. Thus the total number of detection devices which may be connected to any zone can be calculated as 1.6mA divided by the quiescent current per device.

7.0 BATTERY REQUIREMENTS

The current consumption of the control panels in the mains failure model is as follows:

(i)	2 ZONE PANEL	-100mA
(ii)	4 ZONE PANEL	-130mA
(iii)	8 ZONE PANEL	-170mA
(iv)	12 ZONE PANEL	-200mA

(i.e. Plus 5mA per zone)

The current consumption of the Control Panels in full alarm mode is as follows:

(i)	2 ZONE PANEL	-250mA
(ii)	4 ZONE PANEL	-270mA
(iii)	8 ZONE PANEL	-430mA
(iv)	12 ZONE PANEL	-590mA

(i.e. Plus 40mA per zone)

Recommended battery sizes for 24 hours stand-by are as follows:

(i)	2 ZONE PANEL	-4.0 Ah
(ii)	4 ZONE PANEL	-4.0 Ah
(iii)	8 ZONE PANEL	-4.0 Ah
(iv)	12 ZONE PANEL	-6.0 Ah

The above figures do not take into account any additional equipment (eg. relays or additional sounder boards) which may be connected to the control equipment.

8.0 HYDROWIRE COMMISSIONING DETAILS

8.1 Installation

8.1.1 Lengths of hydrowire should be laid on the floor in the protected area such that the distance between any two hydrowires is no more than 2 meters.
8.1.2 For localised protection of sources of potential water leakage, such as air conditioning systems or water filled radiators, the distance between hydrowires may be greater
8.1.3 The cable should be installed such that it remains in contact with the floor along as much of its length as possible. This may require the use of P-clips, particularly in areas where the cable may be disturbed.
8.1.4 Although the construction is quite sturdy, the cable may be damaged by crushing or excessive bending. A bend radius of 150mm is reconnected as a minimum
8.1.5 The end of the hydrowire must be terminated with an end of line plug (K2110)
8.1.6 The connection box (K2106) should be secured to the wall or floor such that the hydrowire does not have to be stretched or pulled to reach it.

Continued...

8.1.7 The installed hydrowire should consist of a connection box (K2106), hydrowire cable and end of line plug unit (K2110).
8.1.8 The red warning label should be left such that it is clearly visible.
8.1.9 Hydrowire should not come into contact with surface temperature greater than 70°C.
8.1.10 Lengths greater than 50 metres are not allowed.

8.2 Connection to Control Panel

8.2.1 The (K2106) connection box, when triggered presents an impedance of 470 R to the 24 volt circuit from the control panel.
8.2.2 The + and – terminals inside the connection box must be connected to the Z+ and Z- terminals at the control panel.
8.2.3 The end of line resistors at the control panel should be discarded.
8.2.4 It is advisable to leave off the lid of the connection box, until all testing is complete.

8.3 Remote Lamp Connection

8.3.1 IN some installations, particularly in floor voids, it is desirable to identify the area in which water has been detected, with a remote indicator unit mounted above the void.
8.3.2 This can be achieved by wiring a K2103 remote lamp unit to the – and remote terminals in the connection box.
8.3.3 Only one remote lamp unit should be connected to each connection box.

8.4 Testing

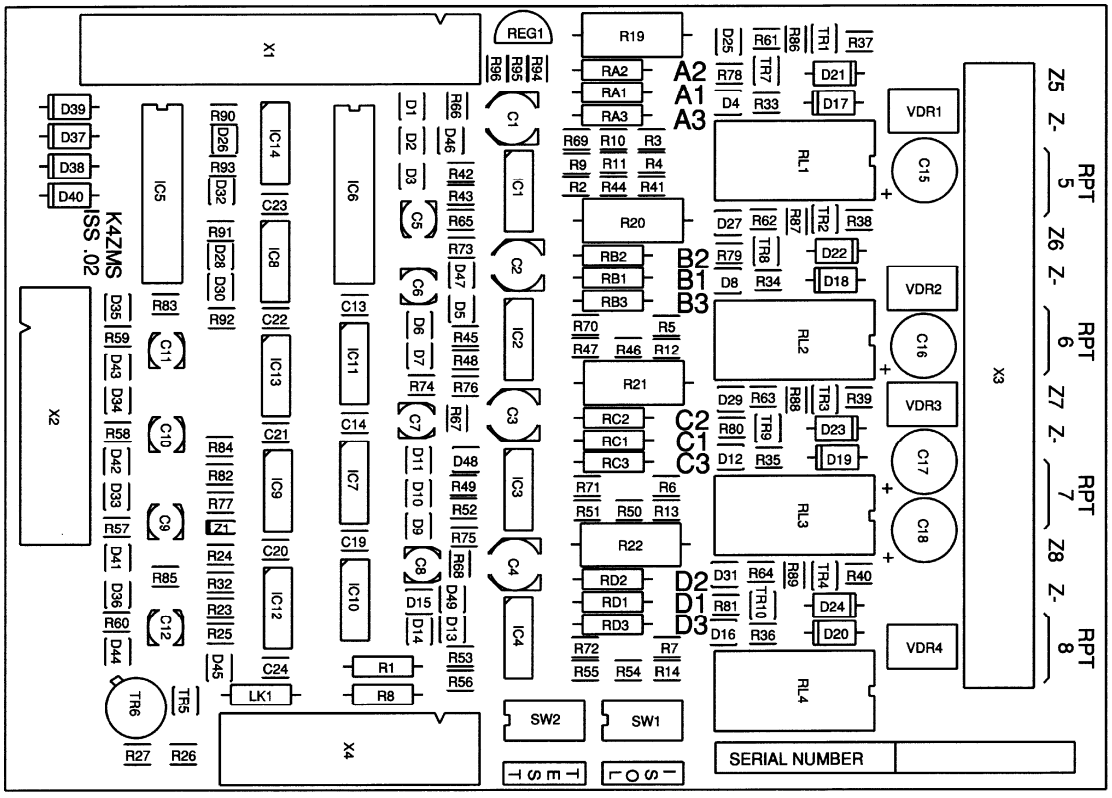
8.4.1 Once all terminations have been made and the system is powered, the hydrowire is ready for testing.
8.4.2 Testing is best done by dipping the thump and forefinger into a cup of tap water, shaking off the excess drips and then gripping the hydrowire firmly whilst rolling it slowly. This should produce an immediate indication at the control panel.
8.4.3 Over wetting the hydrowire should be avoided as a great deal of time can be wasted by waiting for it to dry out.

8.5 General Checklist

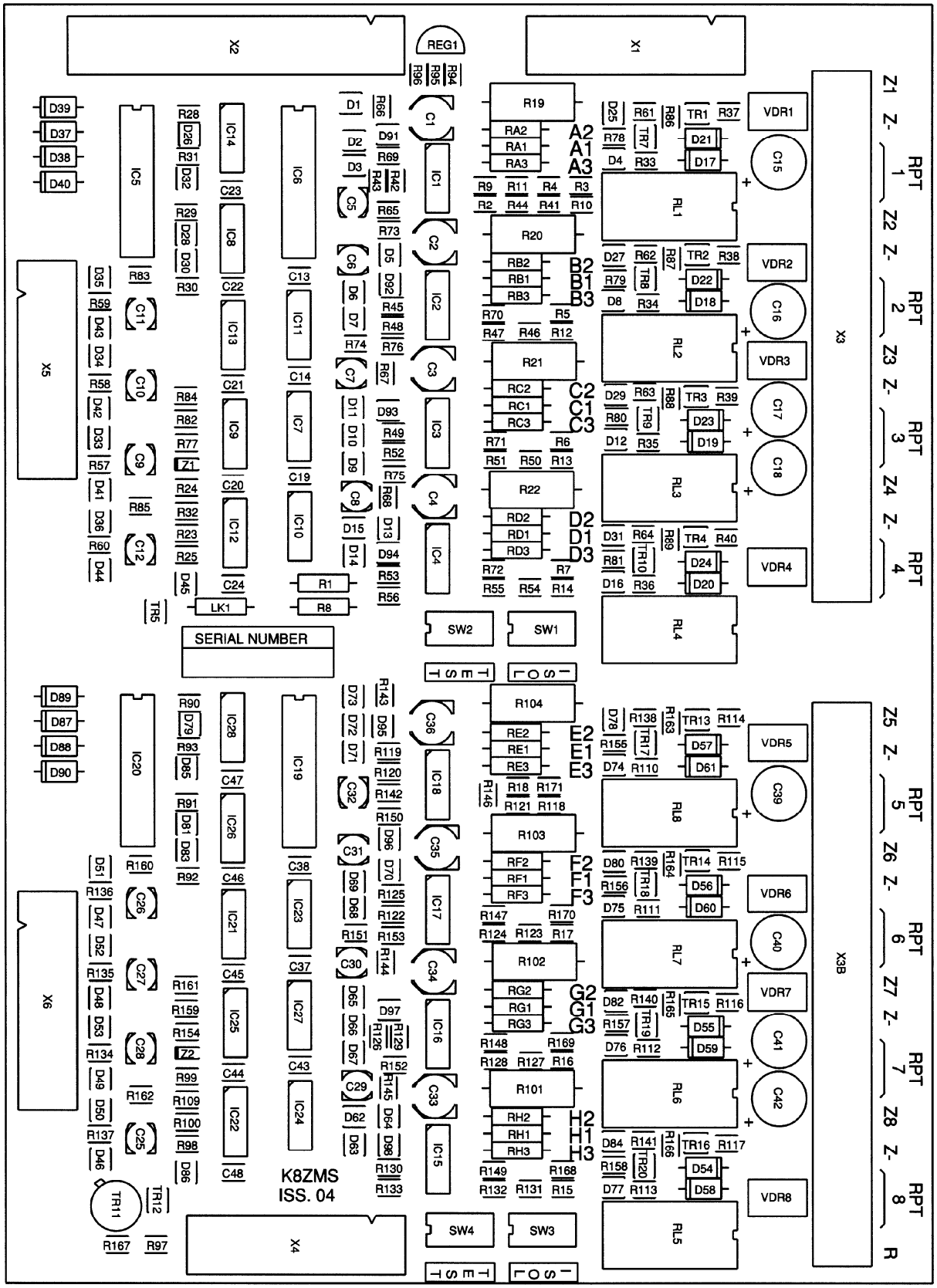
8.5.1 Avoid excessive wetting.
8.5.2 Observe polarity of all connections.
8.5.3 Long lengths of hydrowire may be susceptible to high levels of electrical noise. Keep lengths short wherever possible and do not install close to other cables.
8.5.4 Do not twist, bend sharply, stretch, stand on or crush the hydrowire.
8.5.5 Do not expose to surface temperatures above 70°C
8.5.6 Use only recommended hydrowire system components.

Option 1 – Non latching zones. Remove following diodes				
PCB Type	Zone 1	Zone 2	Zone 3	Zone 4
Con.05	D17	D18	D19	D20
K4.ZMS	D17	D18	D19	D20
K8.ZMS	D17	D18	D19	D20
	Zone 5	Zone 6	Zone 7	Zone 8
	D61	D60	D59	D58
Option 2 – Silent operation i.e. no bells in alarm condition. Remove the following diodes:				
PCB Type	Zone 1	Zone 2	Zone 3	Zone 4
Con.05	D37	D38	D39	D40
K4.ZMS	D37	D38	D39	D40
K8.ZMS	D37	D38	D39	D40
	Zone 5	Zone 6	Zone 7	Zone 8
	D87	D88	D89	D90
Option 3 – No remote signal i.e. auxiliary contacts. Remove the following diodes				
PCB Type	Zone 1	Zone 2	Zone 3	Zone 4
Con.05	D97	D98	D99	D100
K4.ZMS	D21	D22	D23	D24
K8.ZMS	D21	D22	D23	D24
	Zone 5	Zone 6	Zone 7	Zone 8
	D57	D56	D55	D54
Once an option has been set it cannot be reset as the component has been removed				

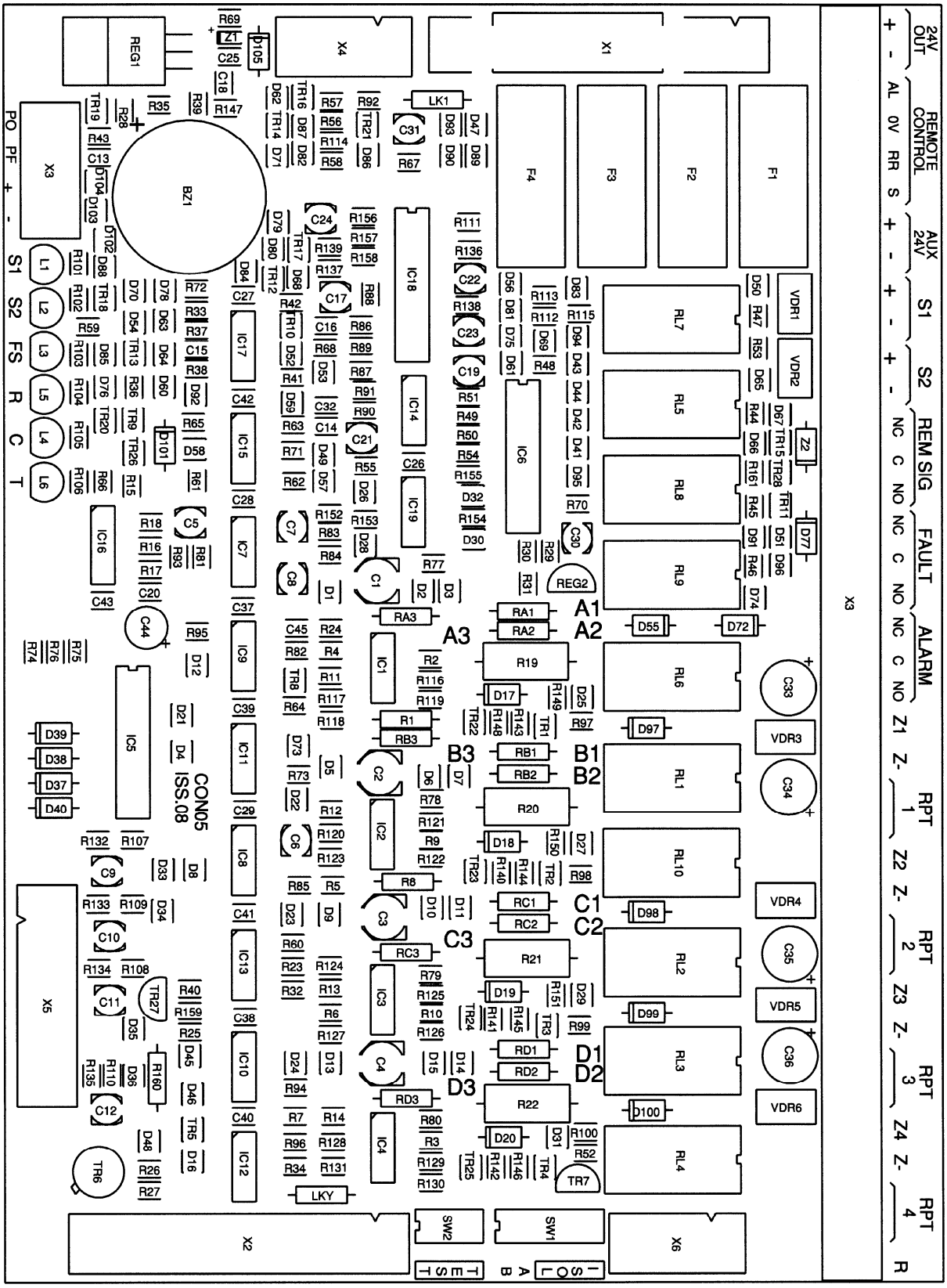
Annex 1 – K4.ZMS PCB



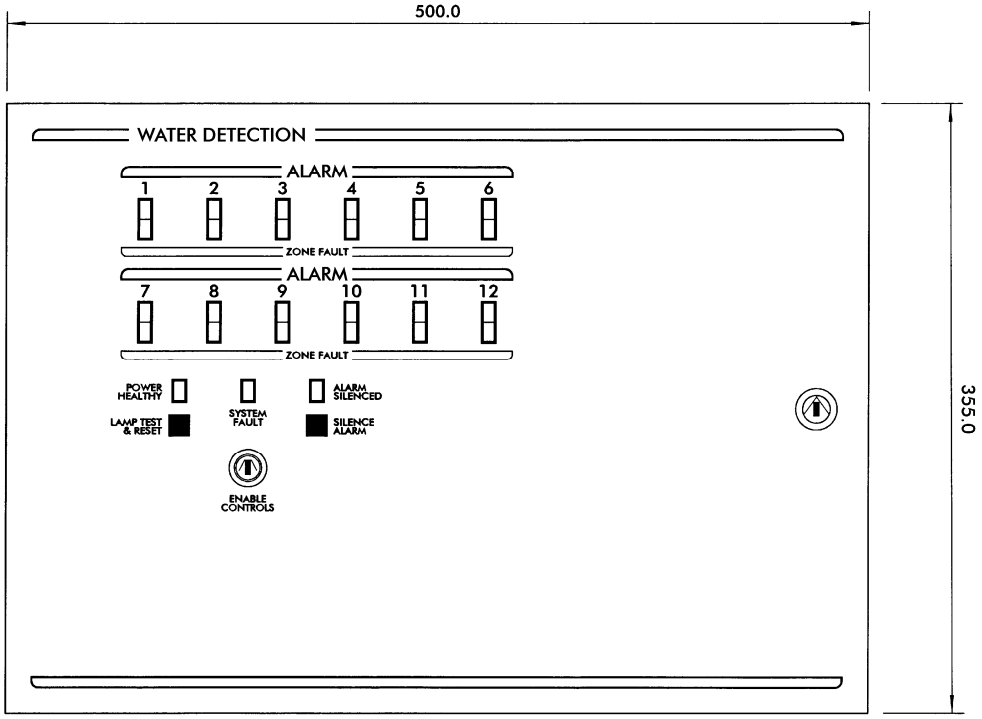
Annex 2 – K8.ZMS PCB

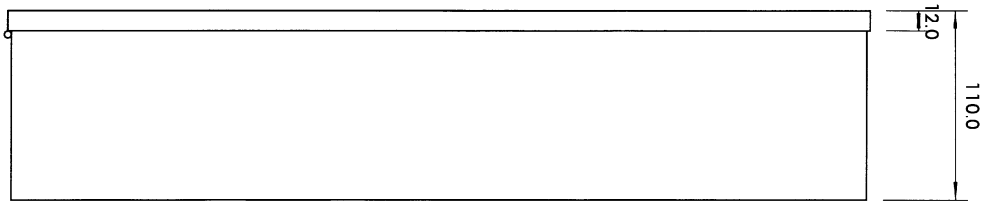


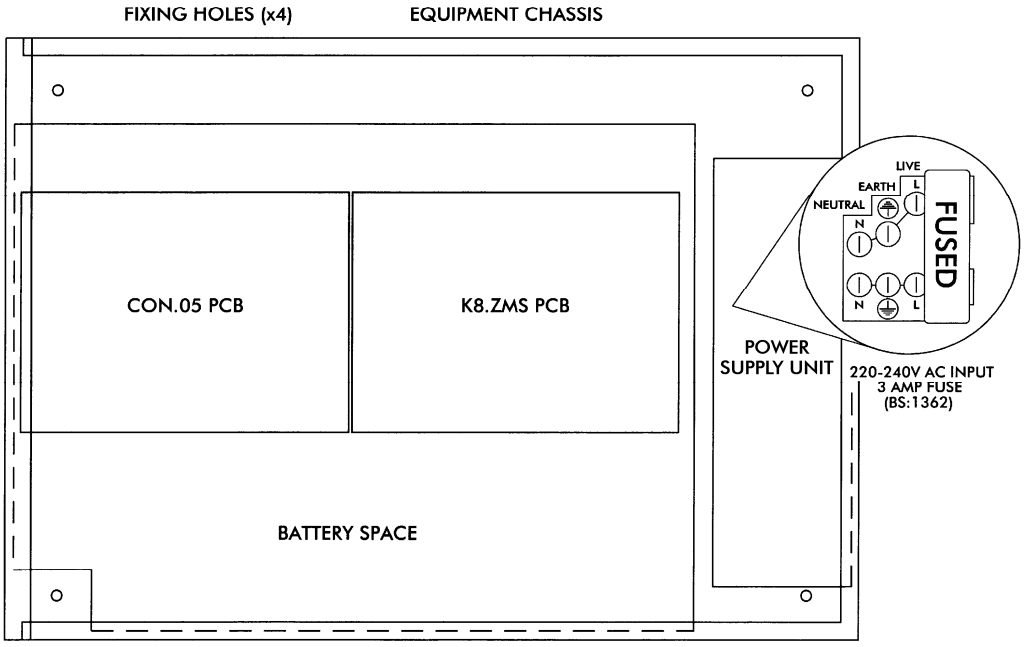
Annex 3 – Con.05 PCB



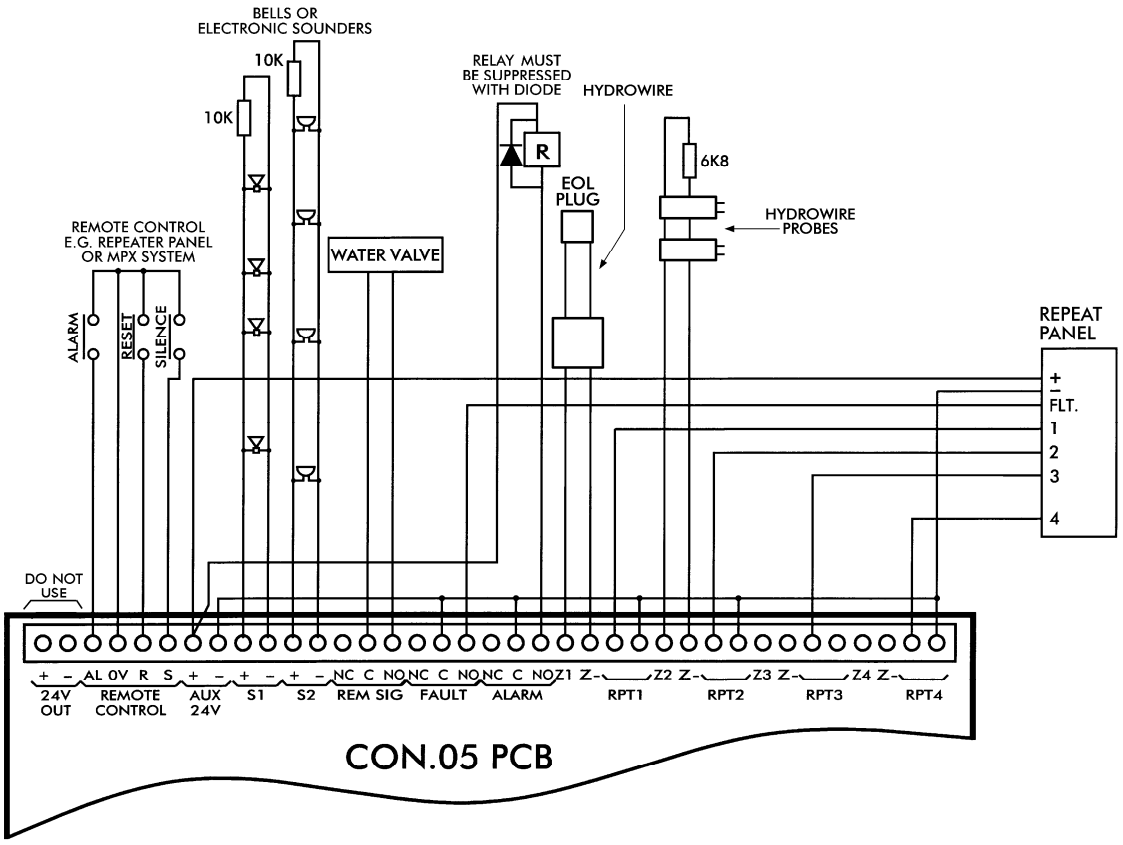
Annex 4 - Typical K2000000 Installation & Mains Supply Connection

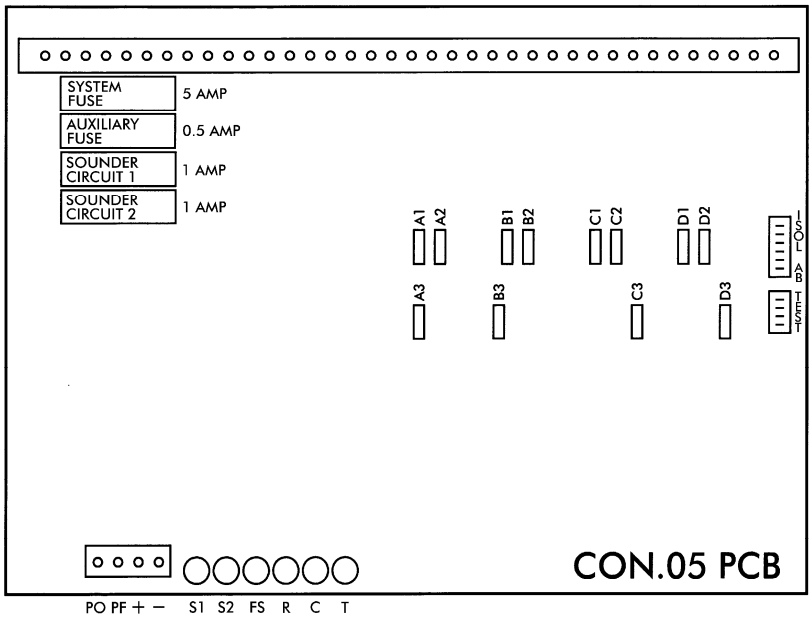






Annex 5 - Typical Field Wiring & Location of Optional Links & Resistors





SHORT CIRCUIT

TO REMOVE SHORT CIRCUIT MONITORING
REMOVE RESISTORS
A3 - Z1
B3 - Z2
C3 - Z3
D3 - Z4

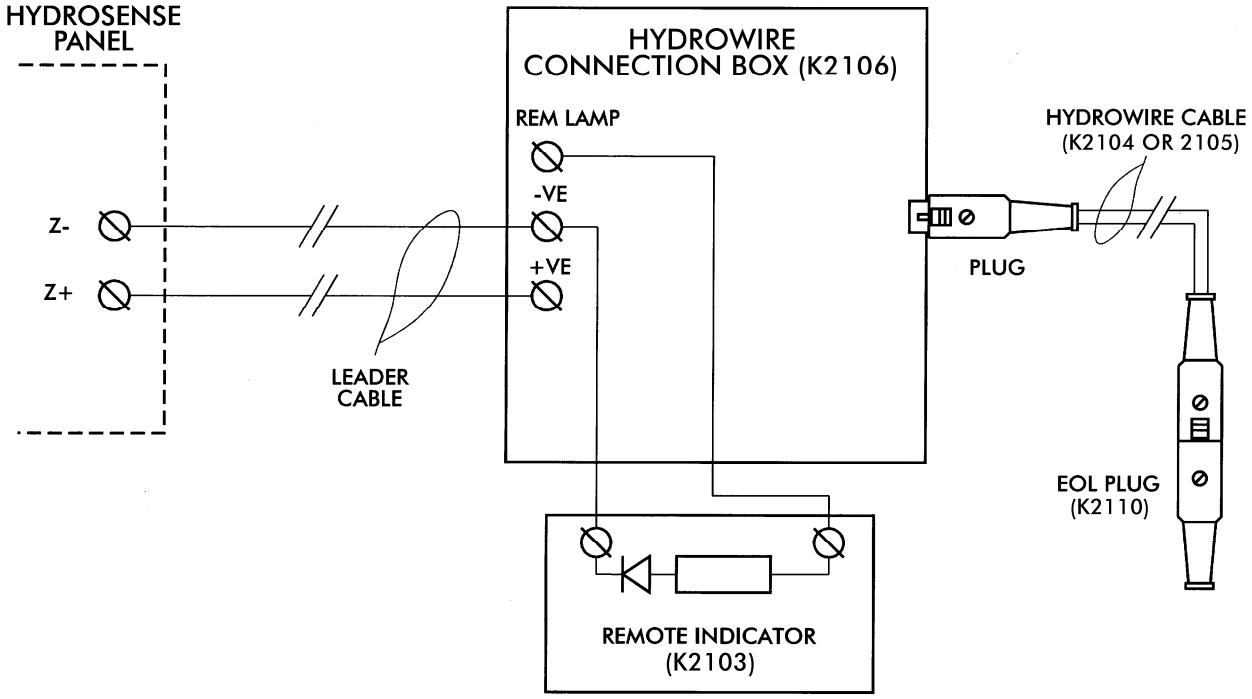
NOTE

THE TEST FACILITY CAN NOT BE USED,
ON ZONES MODIFIED FOR SHORT CIRCUIT

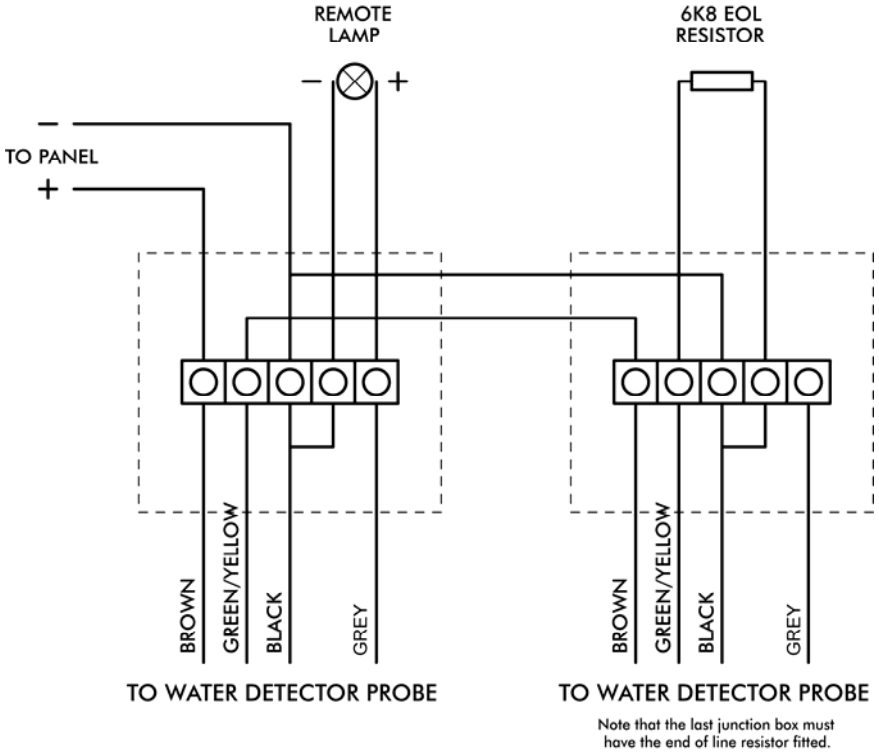
SWITCH B ON = CONTINUOUS OV (REMOTE CONTROL)
SWITCH B OFF = PULSING OV (REMOTE CONTROL)
SWITCH A ON = REMOTE SIGNAL CONTACT ACTIVE
SWITCH A OFF = REMOTE SIGNAL CONTACT ISOLATED

Annex 6 – Hydrowire Connection Diagram & Probe Wiring Diagram

Hydrowire connection diagram

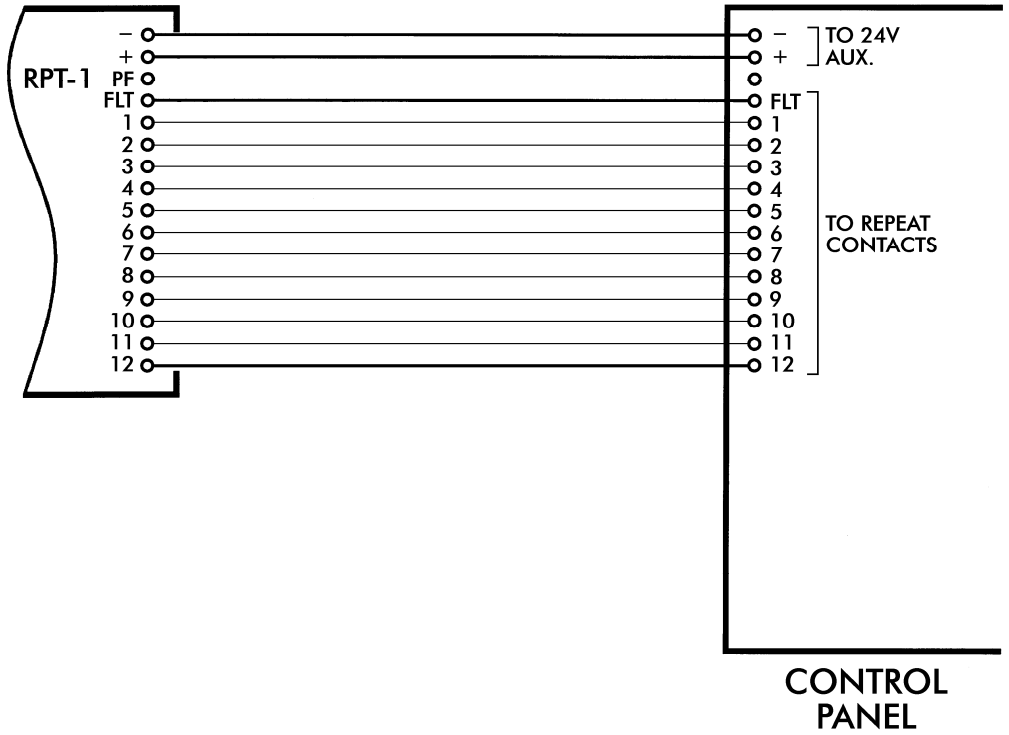
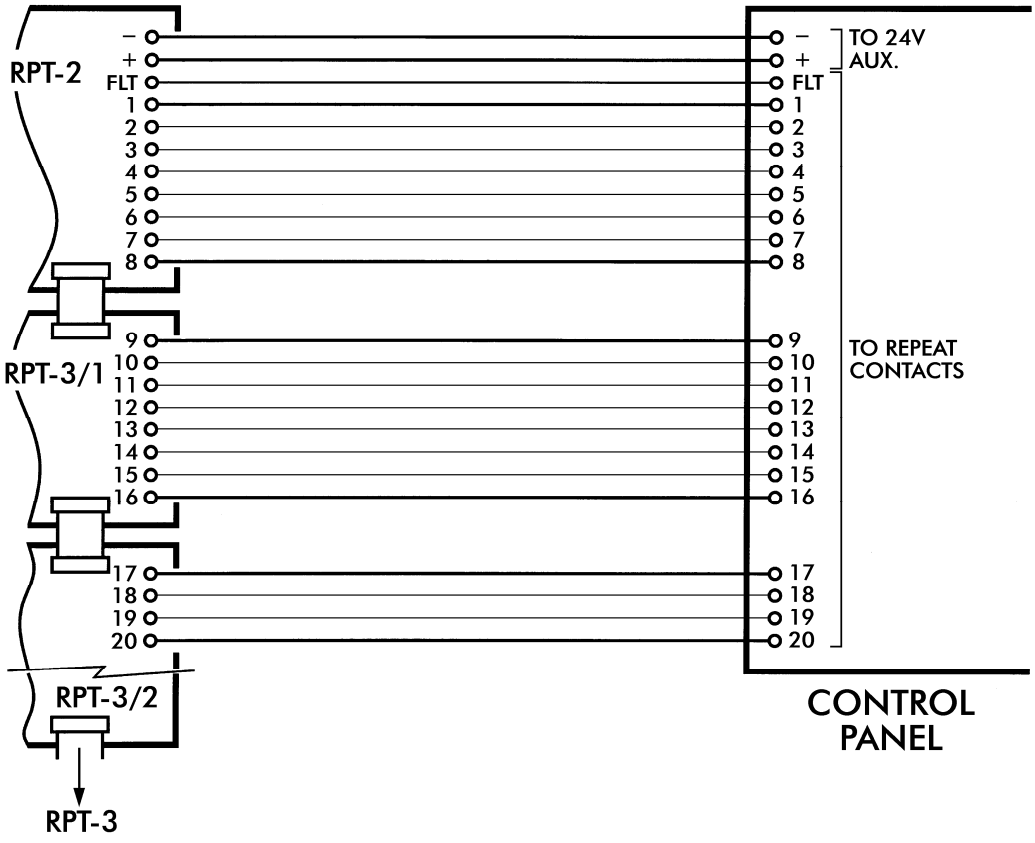


Hydrosense Probe Wiring Diagram



Annex 7 – Conections for Repeaters

Connection for repeaters from 4 zones to 12 zones inclusive



Connection for repeaters from 16 zones to 48 zones inclusive